

vance of that hitherto employed by him; yet he would not renounce altogether the corset treatment in favor of massage. He would limit the use of the corset to school time. Experience had taught him that the complete removal of the corset all at once hindered improvement.

Herr Kolliker, of Wurzburg, remarked that the most essential difference between Landerer's treatment of scoliosis from that hitherto employed consisted in energetic percussion of the muscles. He mentioned a very severe case of scoliosis with three curves which he had treated daily for three months by means of massage and percussion for several minutes night and morning, and thereby obtained a brilliant result never before equalled in his experience. With scoliosis of the second degree the corset should be applied in the intervals between massage.

DOUGLAS GRAHAM.

KOEHL ON THE CAUSES OF THE DIFFICULTIES IN DISPENSING
WITH THE TUBE IN SOME CASES OF TRACHEOTOMY
FOR DIPHTHERIA.¹

The time for the removal of the canula in cases of tracheotomy must differ in hospital and private practice. If we regard a severe diphtheria as having run its course in four or five days, the trachea at the end of this time being passable to air the canula is justly removed. Delay in the removal of the tube is a fertile cause of stenosis (granulom) of the trachea. By the comparison of various statistics it is found that fourteen days is the interval at the end of which in the majority of severe cases the larynx becomes again permeable. Allowing eight days additional for attempts at removal of the tube, we have an extreme limit of three weeks to work upon. If the efforts at the removal of the canula extend beyond this period, we can with justice speak of a difficulty or obstacle to the removal of the canula. The author of the above paper has passed in review various conditions of the larynx which are apt to cause delay in removal of the canula. The first condition considered: Diphtherie a forme prolongée (Cassicourt) has

¹Ueber die Ursachen der Erschwerung des Décanulement nach Tracheotomie in Kindesalter wegen Diphtherie. By Emil Köhl. Archiv. f. klin. Chirurgie. Bd. XXXV, Hft. I.

already been discussed by the French author and Henoch (*Charité Annals*). Recurrent attacks of diphtheria with a new onset of fever and formation of pseudo-membrane also will necessitate reintroduction of a tube already removed.

Chorditis inferior is an important condition which may for a time escape recognition. This is a swelling of the mucous membrane and submucous tissue below the true cords and above the cricoid cartilage. In infectious diseases it may set in as an acute condition and give rise to serious symptoms. After diphtheria it rarely necessitates a second tracheotomy and is of a mild form. With the laryngoscope we can easily see it as a pouting of the mucous membrane from beneath the true cords and on the posterior laryngeal wall. In extreme cases the movements of the cords are interfered with or entirely suspended, (Gerhart, Störk, Rauchfuss, etc.). The treatment of this condition is limited to topical applications of silver. It must be carefully differentiated from the condition known as *granulations stenosis*. The author has collated a large number of cases of this condition scattered through the French and German literature. It is not as infrequent as generally supposed. The formation of granulations into a distinct growth delays at times the withdrawal of the canula or necessitates its reintroduction. In some cases, though existing, these granulations give rise to no outward symptoms and are only accidentally discovered. In other instances the tracheal tube being withdrawn there is a gradually increasing dyspnoea which becomes more pronounced when the patient takes the recumbent posture (sleep), diminishing when the patient sits upright. These attacks of dyspnoea may threaten the life of the patient or cause sudden death.

In some cases such dyspnoea ensues immediately on withdrawal of the canula as to necessitate its reintroduction. The canula in cases may be withdrawn and then an attack of coughing setting in the polypus is expelled from the trachea and the dyspnoea definitely disappears. Difficulty may at first be experienced on removal of the canula, and these obstacles may disappear with the spontaneous atrophy of the granulations. The pedicle of some of these polypous

growths may become twisted and thus cause strangulation of the growths. Lastly where the obstruction of the trachea through granulation has caused a necessity for repeated reintroduction of the canula, this manœuvre alone by exerting a certain amount of mechanical pressure has caused atrophy of the growths. No difficulty may be experienced upon or after the removal of the canula, and yet the presence of these granulations cause a sudden and single attack of dyspnoea which may kill the patient.

The polypi resulting from exuberant granulations ("granulom") may be seated on the upper or lower angles of the tracheal incision, or around the whole circuit of the wound. Again the anterior and posterior tracheal wall which comes into contact with the extremity of the canula and finally the part of the posterior wall of the trachea which impinges on the convexity of the canula may all be the seat of granulom. There is no case in the literature which will prove that points other than the above are affected by granulom after tracheotomy. It is still questionable whether a granulation polypus can develop on the base of a necrotic loss of substance, the result of the diphtheria; such a loss of substance can affect any part of the trachea and usually when extensive ends with the death of the patient. The so-called diphtheritic ulcers or loss of substance are generally superficial and heal without stenosis. Stenosis only results at the points above mentioned and never have been observed elsewhere. The rarest point for the formation of granulom are the anterior and posterior tracheal wall opposite the lower end of the canula. But the anterior wall at the point above is the most favorite seat for the development of decubitus ulcers with a consequent cicatricial stenosis, resulting in the formation of a sickle-shaped fold of tissue encroaching on the lumen of the trachea.

The borders of the incision are no doubt the most favorite seat for the development of granulom. Here these growths may at first be broad at the base later on becoming sessile (polypi). The author from a careful study of cases concludes that the larger the incision in the trachea (thereby increasing the triangular void spaces above and below the canula) the more abundant the formation of these granulations. The fenestrated canulae are also a fertile agent in favoring the production of

granulom. The fenestrated canulæ are only to be employed in those cases where a temporary paresis of the vocal cords from long disease (gewöhnheits parese) delays décanulement. It is easy to understand how abundant granulations may obstruct the trachea. But to reconcile the great danger to life with some small sessile granulomata it must be supposed that they are somewhat larger during life than as found post mortem. By causing a collection of mucus in the trachea at night and also by irritating the posterior wall of the trachea they cause intense respiratory efforts of the patient. The growths themselves during these attacks of asphyxia become turgescient, enlarged and necessitate operative interference. Diagnosis in these cases is by no means so simple. Intra-tracheal inspection with mirrors or the inspection from the mouth, the character of the dyspnœa (worse at night). A peculiar flapping sound on auscultating the trachea (Perier) are among the aids mentioned. Chorditis inferior is to be excluded in all these cases. The therapy of this condition (granulom) runs the gamut of operative interference, cauterization by silver, acids, heat, curetting, crushing and snaring the growths. These operative measures are followed by a careful avoidance of décanulement until the dangers attending the above are past. Fenestrated canulæ are not to be used. The rational prophylaxis in the above cases is first that the incision in the trachea be gauged carefully to fit the canula introduced. The tracheotomy, if possible, should be a superior one. Attempts to remove the canula should be made from the third or fourth day after introduction. When the canula is removed the wound is simply covered with a piece of moist gauze to prevent mucous incrustations, cauterization of exuberant granulations is resorted to and fenestrated canulæ avoided.

Distortions of the tracheal walls, among others a projecting forward of the posterior wall of the trachea may form an obstacle to removal of the canula. This occurs above the convex portion of the canula and where the incision in the trachea is large or the canula of great diameter. The above may be complicated with a backward dislocation of the anterior wall of the trachea or granulom. In the child's larynx these complications are of especial serious moment. In large in-

cisions the extremities of the tracheal rings may be dislocated backward into the lumen of the trachea and fixed in this false position causing stenosis. Prophylaxis points chiefly to performing a pure superior tracheotomy and saving the cricoid cartilage intact, for the support of the rest of the trachea.

Relaxation of the anterior wall of the trachea with a funnel shaped drawing inward of the same during inspiration may be caused by widespread necrosis of the anterior wall. The author has given in this brochure a very exhaustive consideration of the various methods of treatment of stenosis of the trachea, especially cicatricial stenosis. Chorditis inferior is included under the above chapter. The treatment finds its principal support in the various methods of dilatation by bougies and canulæ introduced from the wound or mouth. The author closes the above paper by a careful consideration of the paresis and paralysis of the structures of the soft palate and vocal cords as a prominent obstacle to the removal of the canulæ after tracheotomy.

The first attempts at removal of the canula having failed the little patients resist any further attempts at décanulement, this resistance easily causes attacks of dyspnœa, and warns against any removal of canulæ under these circumstances. The above the author has ranked under "moral influences" preventing décanulement.

Under "Spasmus Glottidis" he has discussed the so-called attacks of spasm of the glottis which by French authors are said to follow in some cases after removal of the canula.

He has not met any cases in his own experience though not at all doubting the possibility of its occurrence. In closing we would like to notice a peculiar condition of "paresis from disuse" (*Gewohnheitsparese*) which is mentioned by the author as giving in certain cases rise to urgent symptoms on removal of the canula. There is here a paresis of the dilators of the glottis which have remained inactive during the disease. Presupposing that all other obstacles to the removal of the canula have been disposed of and excluded (*granulom*), we find that on removal of the canula the excitement attendant on the operation calls forth intense dyspnœa, or if the canula is removed there may be momentary quiet followed in a short time by dyspnœa necessitating reintroduction of the canula. Here the fenestrated canulæ find their most pertinent application.

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